IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.:	10/613,371	**Confirmation No.:**	4837
Applicant:	Kazunari Motohashi		
Filed:	July 3, 2003		
TC/A.U.:	1773		
Examiner:	Kevin M. Bernatz		
Docket No.:	075834.00409		
Customer No.:	33448		

SUPPLEMENTARY APPEAL BRIEF

In accordance with the Order of the Board of Appeals on August 31, 2007, and consistent with the interview between Applicants and the Examiner conducted on Friday, September 7, 2007, Applicants submit herewith an Amendment After Final canceling claim 2 and a supplemental Appeal Brief which reflects the same. Applicants submit that this action places this Appeal in condition for review by the Board.

I. REAL PARTY IN INTEREST

The real party in interest is Sony Corporation as a result of transfer of all right, title and interest to the subject matter of this Application Serial No. 10/613,371, via the Assignment recorded in the Patent Office in Reel 014269 Frame 0058 on July 3, 2003.

II. RELATED APPEALS AND INTERFERENCES

Applicant and the undersigned are unaware of any further related judicial proceedings, appeals, or interferences in relation to the instant Appeal.

III. STATUS OF CLAIMS

The claims currently stand in condition as modified by an Amendment A dated November 16, 2004 amending claim 1, as further modified by Amendment Accompanying RCE dated June 24, 2005 amending claim 1, as further modified by an Amendment Accompanying B dated March 19, 2006 amending claim 1 and adding new claims 2 and 3, and as finally modified by an Amendment After Final canceling claim 2. Accordingly, claims 1 and 3 are currently rejected and appealed, and stand in condition as set forth in the attached Appendix of Claims on Appeal.

IV. STATUS OF AMENDMENTS

An Amendment After Final has been filed accompanying this Supplementary Appeal Brief that cancels claim 2. No further Amendment After Final affecting the claims has been filed or entered by the Examiner. Accordingly, all remaining claims stand in condition as set forth in the attached Appendix of Claims on Appeal.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates to a high-density magnetic recording medium for use in a system using a magnetoresistive effect magnetic head (MR head) or a giant magnetoresistive effect magnetic head (GMR head). The magnetic recording medium of the present invention is extremely advantageous in effectively utilizing high reproduction sensitivity for MR or GMR heads. The present invention is directed to a particular type of magnetic thin films in which a metallic material is deposited through vacuum thin film

forming techniques over a non-magnetic substrate material. Such magnetic thin-film tapes have excelled in coercive force and in squareness ratio. (See pages 1 – 2 of the Background of the Invention).

Traditionally, thin-film deposition is accomplished by making an elongated nonmagnetic support run in the longitudinal direction and depositing a magnetic material on a major surface of the nonmagnetic support while the tape runs, thereby forming a magnetic layer. However, when the thickness of the magnetic tape produced by using the oblique evaporation method is reduced from 200nm to under 55nm, the number of magnetic fine particles contained in the direction of film thickness becomes very small. As a result, the orientation of the deposited magnetic fine particles begins to seriously affect the magnetic properties of the entire magnetic layer. (See page 4: Summary of the Invention).

As described on pg. 6 of the disclosure and in Fig's 1A, 1B, 2A, and 2B, Applicants have identified a critical range of operation (under 55nm) in which the arranging directions of the dispersed metallic particles no longer follow a continuous distribution (See Fig's 1A and 1B), but rather form several distinct discrete orientations (See Fig's 2A and 2B). Accordingly, Applicants invention is directed to a method of providing an optimal growth orientation of magnetic particles in thin-film magnetic recording mediums for use with magnetoresistive effect and giant magnetoresistive effect heads to reproduce a signal. (See the bottom of page 7 of the disclosure). As a result, electromagnetic conversion properties are enhanced (See page 8 of the disclosure).

In accordance with the foregoing, independent claim 1 is directed to a thin magnetic recording medium having a magnetic recording layer 3 that is 50 nm or less and wherein an angle θ (See Fig. 5) which is a growth direction of magnetic particles in a longitudinal cross-

section of said magnetic layer with respect to a line normal to said nonmagnetic support, satisfies the following relation: $\theta i - \theta f \leq 25°$ (See Fig. 5 and pg. 15 of the specification), where θi is an angle of initial growth for said magnetic layer, and θf is an angle of final growth for said magnetic layer, and further wherein a deposition range is restricted such that a maximum incidence angle αi and minimum incidence angle αf satisfies the relationship: $\alpha i - \alpha f \leq 25°$ (See pg. 15 of the specification).

Finally, dependent claim 3 is directed to a magnetic recording medium according to claim 1, further wherein the magnetic layer 3 is less than the 50 nm in thickness (See Examples 2 and 3 in Tables 1 and 2, pg.'s 26 and 27 of the specification).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether the teachings of the *Ishida et al.* (U.S. Patent No. 5,554,440) reference provide the requisite disclosure in order to render anticipated obvious claims 1 and 3 under 35 U.S.C. §102(b).

VII. ARGUMENT

Applicant respectfully submits that the prior art references of record, whether considered alone, or in combination, fail to teach or suggest Applicant's presently claimed invention. As detailed below, the rejections set forth by the Examiner are improper.

A. **The Cited References Fail to Render Anticipated the Claimed Invention as specified in Claim 1.**

Applicant respectfully requests reconsideration of the Examiner's rejection of claim 1 under 35 U.S.C. §102(b). The Examiner has rejected this claim in view of the cited prior art reference of *Ishida et al.* (U.S. Patent No. 5,554,440).

Claim 1 currently contains the following limitations, numerically numbered for ease of reference:

1) A magnetic recording medium having a magnetic layer with a thickness 50 nm or less formed over a surface of an elongated nonmagnetic support by a vacuum thin film forming technique,

2) wherein an angle θ which is a growth direction of magnetic particles in a longitudinal cross-section of said magnetic layer with respect to a line normal to said nonmagnetic support, satisfies the following relation:

$$\theta i - \theta f \leq 25°$$

where θi is an angle of initial growth for said magnetic layer, and θf is an angle of final growth for said magnetic layer, and

3) and further wherein a deposition range is restricted such that a maximum incidence angle αi and minimum incidence angle αf satisfies the relationship:

$$\alpha i - \alpha f \leq 25°.$$

Applicant notes that the main contentions remaining between Applicant and the Examiner is the extent to which the prior art anticipates the claim element (1) regarding the thickness of the magnetic layer and the claim element (2) regarding the growth orientation of the deposited magnetic particles.

In regard to the first claim limitation, *Ishida* fails to anticipate Applicants claimed magnetic layer at a thickness of 50nm or less. (See Table 1 on page 26 of Applicants disclosure). Specifically, see column 14 at lines 57-60 of the *Ishida* reference, which states that the magnetic layer should preferably be grown at a thickness of "from 50nm to 150 nm." From this statement alone, it is not clear whether the endpoints, 50nm or 150nm, are included in the range. However, when read in light of Column 14, lines 42 – 55, it is clear that the reference discloses that the 50nm mark is not included, while the 150nm mark is. More specifically, the reference teaches that "When the thickness of the magnetic layer exceeded 50nm, the output tended to saturate while the noise increased, so that the C/N tended to decreased [sic] in the thickness range of 150nm or larger...But, when the thickness of the magnetic layer exceeded 150nm, the overwriting property slightly deteriorated with the increase of the thickness of the magnetic layer." In light of the use of the term "exceed," and in light of Fig. 21 which shows the C/N ratio decreasing rapidly and significantly under at 50nm and below, Applicants submit that one of ordinary skill in the art would interpret the stated range of operation to be 50nm (exclusive) to 150nm (inclusive). Such a range fails to anticipate Applicant's currently claimed invention.

In contrast to the above references, Applicant has identified the criticality of the range of magnetic particle growth angles that maximize the electromagnetic conversion characteristic (CNR) for a thin magnetic tape which is 50nm or less. See, for example,

Figure 6 of Applicants disclosure which compares the much narrower critical range required of such a device compared to the thicker range disclosed in *Ishida*.

Neither reference cited, alone or in combination, teaches or suggests such a range in a thin film magnetic tape, or the criticality of such a range as shown in Figures 1A – 2B, in regard to the discontinuities created in the orientations of the dispersed magnetic particles.

Regarding the second claim element directed to the growth orientation of dispersed magnetic particles, Applicants submit that the prior art of record fails to teach or suggest anything regarding the actual growth orientation of the dispersed magnetic particles. Furthermore, Applicants submit that, counter to the Examiner's assertion; the growth direction of the dispersed crystals is not directly proportional to the incidence angle of deposition. For example, see the Comparative Examples 1 in Table 1 on page 26 of the disclosure, which shows that an initial incidence angle of 70° results in a growth orientation of 54°, and a final incidence angle of 40° results in a growth orientation of 27°. Significantly, when comparing this to Comparative Example 2 in Table 1, an increase in the initial incidence angle by 5° (to 75°) results in an increase of the growth orientation by 9° (to 63°). Furthermore, an increase in the final incidence angle by 5° (to 45°) results in an increase of the growth orientation by only 2° (to 29°). Accordingly, Applicants submit that the Examiner's prima facie assertion of anticipation cannot stand, as it is clear that the growth direction of the dispersed magnetic crystals is not directly proportional to the incidence angle.

For all the reasons set forth above, Applicants submit that the Examiner's rejection of claim 1 under 35 U.S.C. §102 must be withdrawn, and claim 1 placed into condition for allowance.

B. The Cited References Fail to Render Anticipated the Claimed Invention as specified in Claim 3.

Applicant respectfully requests reconsideration of the Examiner's rejection of claim 3 under 35 U.S.C. §102(b) and alternatively under §103(a). The Examiner has rejected this claim in view of the cited prior art reference of *Ishida et al.* (U.S. Patent No. 5,554,440).

Dependent claim 3 currently contains the following additional limitations over that of independent claim 1:

"further wherein the magnetic layer is less than the 50 nm in thickness."

Applicant notes that the main contention remaining between Applicant and the Examiner is the extent to which the prior art anticipates the claim element regarding the thickness of the magnetic layer.

As noted in the previous section in regard to claim 1, *Ishida* fails to anticipate Applicant's claimed magnetic layer at a thickness of less than 50nm. (See Table 1 on page 26 of Applicants disclosure). Specifically, see column 14 at lines 57-60 of the Ishida reference, which states that the magnetic layer is should preferably be grown at a thickness of "from 50nm to 150 nm." From this statement, it is not clear whether the endpoints, 50nm or 150nm, are included in the range. However, when read in light of Column 14, lines 42 – 55, it is clear that the reference discloses that the 50nm mark is not included, while the 150nm mark is. More specifically, the reference teaches that "When the thickness of the magnetic layer exceeded 50nm, the output tended to saturate while the noise increased, so that the C/N tended to decreased [sic] in the thickness range of 150nm or larger…But, when the thickness of the magnetic layer exceeded 150nm, the overwriting property slightly deteriorated with the increase of the thickness of the magnetic layer." In light of the use of the term "exceed,"

Applicants submit that one of ordinary skill in the art would interpret the stated range of operation to be 50nm (exclusive) to 150nm (inclusive). Such a range fails to anticipate Applicant's currently claimed invention.

Additionally, in regard to the Examiner's obviousness assertion, Applicants submit that the *Ishida* reference clearly teaches away from the further limitation of claim 3. For example, in Column 14, line 58, stating that the thickness of the magnetic layer is "preferably 50nm to 150nm." Furthermore, see Fig. 21 of Ishida, which shows the C/N ratio decreasing rapidly and significantly under at 50nm and below. In light of Federal Circuit caselaw that states that "it is improper to combine references where the references teach away from their combination," Applicants submit that the rejection of claim 3 must be withdrawn, and claim 3 placed into condition for allowance. (See *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983)).

CONCLUSION

In light of the foregoing, Applicant submits that the rejections of all claims are improper for the reasons noted and the rejections should all therefore be withdrawn.

Respectfully submitted,

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(Reg. #37,607)

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CLAIMS APPENDIX:

This listing of claims reflects the current status of the claims as they stand in light of the May 26, 2006 Final Office Action:

1. (Rejected) A magnetic recording medium having a magnetic layer with a thickness 50 nm or less formed over a surface of an elongated nonmagnetic support by a vacuum thin film forming technique,

wherein an angle θ which is a growth direction of magnetic particles in a longitudinal cross-section of said magnetic layer with respect to a line normal to said nonmagnetic support, satisfies the following relation:

$\theta i - \theta f \leq 25°$

where θi is an angle of initial growth for said magnetic layer, and θf is an angle of final growth for said magnetic layer, and

and further wherein a deposition range is restricted such that a maximum incidence angle αi and minimum incidence angle αf satisfies the relationship:

$\alpha i - \alpha f \leq 25°$.

2. (Canceled)

3. (Rejected) The magnetic recording medium according to claim 1, further wherein the magnetic layer is less than the 50 nm in thickness.

IX. EVIDENCE APPENDIX:

None.

X. RELATED PROCEEDINGS APPENDIX:

None.